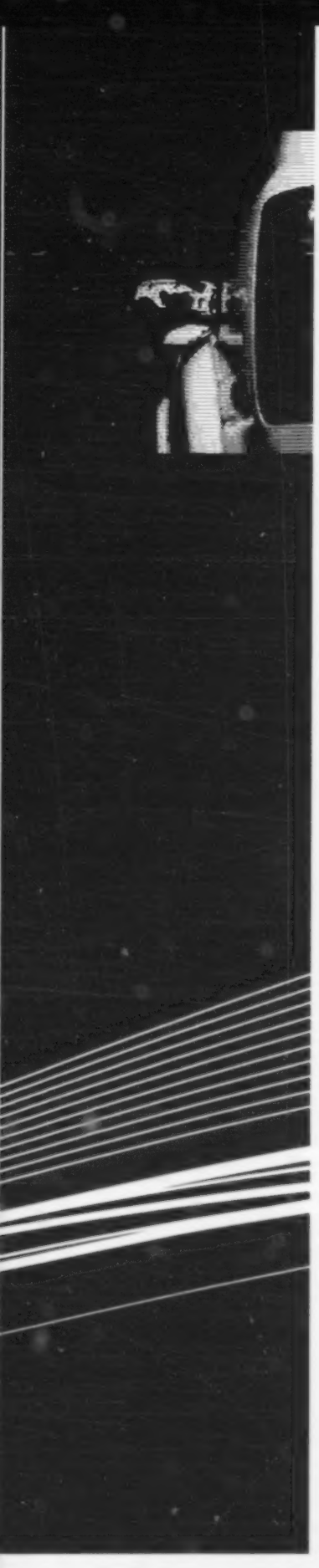
CLIMATE CHANGE FOR 2010

PROGRESS UPDATE ON MANITOBA'S EMISSION REDUCTIONS

AS REQUIRED UNDER SECTION 5 OF

The Climate Change and Emissions Reductions Act (CCERA)



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MESSAGE FROM THE MINISTER OF CONSERVATION AND WATER STEWARDSHIP

On behalf of the Manitoba government, I am pleased to present the 2010 Manitoba Report on Climate Change as required under *The Climate Change and Emissions Reductions Act.*

The Manitoba government is a leader on climate change. That's why we introduced progressive legislation to guide our actions. While there is more work to be done, we are proud of our accomplishments. Together, we have reduced our province's emissions by almost 1 million tonnes. And our emissions in 2010 are projected to be lower than they were in 2000, meeting the initial reporting target set out in legislation.

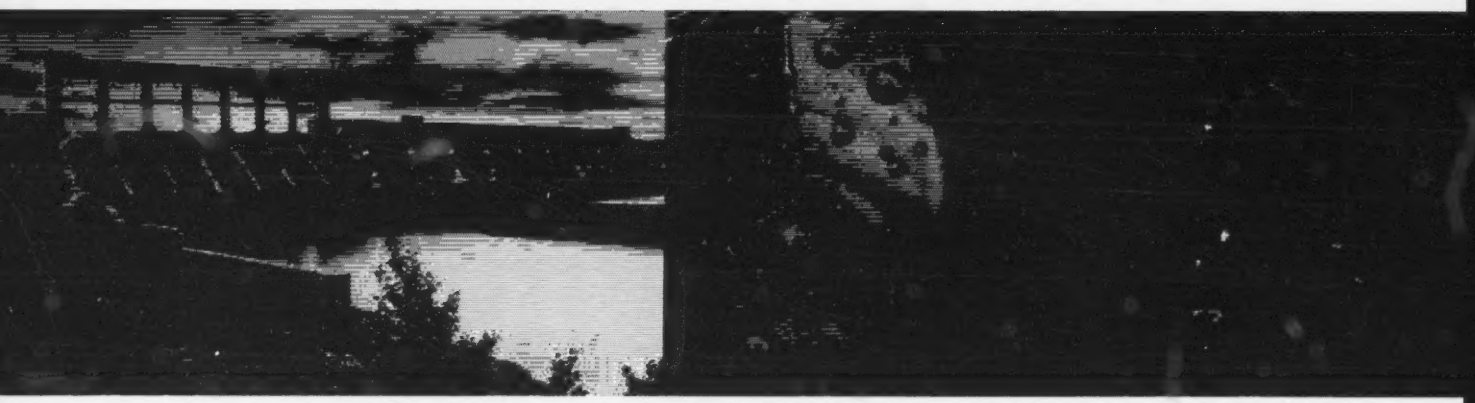
This report details our numerous climate change actions in the areas of agriculture, transportation, energy and adaptation. The report outlines Manitoba's globally significant role in helping to reduce greenhouse gas emissions in other jurisdictions through clean energy exports from Manitoba Hydro, and the protection of our critically important boreal forest, which absorbs millions of tonnes of harmful greenhouse gases every year.

We recognize that Manitoba's greenhouse gas emissions need to be reduced further. To that end, Manitoba will be renewing its climate change action plan and setting new targets in consultation with stakeholders and industry. Manitoba will also be building on its position as a North American leader in green energy and energy efficiency by releasing a new energy strategy that lays out a vision for reducing the use of imported fossil fuels by building renewable hydro resources, improving building energy efficiency, facilitating the electrification of the transportation sector and further building on green alternatives to home heating such as geothermal and biomass energy.

As we move forward, the input and participation of all Manitobans will be critical as we work together to fight climate change and create more sustainable communities while further building a prosperous economy.

Sincerely,

Gord MacKintosh, MINISTER
MANITOBA CONSERVATION AND WATER STEWARDSHIP



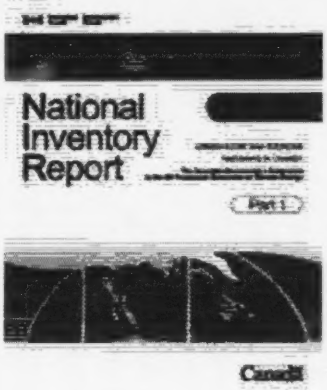
MANITOBA'S REPORT ON CLIMATE CHANGE FOR 2010

EXECUTIVE SUMMARY

Manitoba's status report on climate change outlines the progress made from implementing our 2008 climate change plan to reduce greenhouse gas (GHG) emissions. Climate change is a global problem requiring local action. Manitobans must be commended for their efforts. It is clear that our work is paying off.

Between 1990 and 2000, Manitoba's greenhouse gas (GHG) emissions increased 15 per cent. Our current projections show that our emissions at the end of 2010 were 459 kilotonnes (kt) lower than they were in 2000, reflecting a two per cent reduction. This decline is equivalent to the emissions produced annually by approximately 90,000 vehicles. During this time, we have seen steady growth in Manitoba's population and gross domestic product (GDP).

Not only are we making progress in Manitoba, but our clean energy exports are helping reduce emissions in other jurisdictions. In 2010 alone, Manitoba Hydro displaced over seven million tonnes of GHG emissions in jurisdictions outside Manitoba.



In April 2008, Manitoba released *Beyond Kyoto* – an action plan on climate change that outlined more than 60 actions to reduce greenhouse gas (GHG) emissions across multiple sectors. This was followed by the enactment of Manitoba's *Climate Change and Emissions Reductions Act* (CCERA). The CCERA committed the province to stabilize emissions at 2000 levels, by 2010.

The CCERA directs Manitoba's Minister of Conservation to report on climate change for the year 2010 by December 31, 2011.

This report meets the CCERA's requirements and includes:

- progress on emission reductions achieved in Manitoba
- comparison of Manitoba's total emissions in 2000 and in 2010
- impact of Manitoba's emission reduction actions on other jurisdictions
- Manitoba's actions, and future emissions reductions to 2025
- Manitoba's efforts to reduce emissions in co-operation with other jurisdictions
- Manitoba's emission reduction actions and results, to 2010, in the energy, transportation, agriculture, business and government (municipal and provincial) sectors
- impacts of climate change on Manitoba
- actions Manitoba has taken to adapt to the effects of climate change

Manitoba is fortunate to have an abundance of clean, renewable hydro resources. These resources are the envy of much of the world, and contribute significantly to our province's low emissions profile. They also help reduce emissions beyond our borders through clean energy exports.

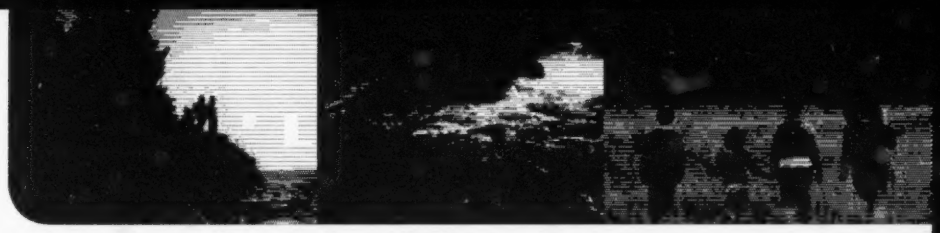
Because emissions in Manitoba mostly originate from many small, widely dispersed sources, our policies and programs must be tailored to address the diversity in our economy. We have set the bar high, and will continue to seek opportunities to reduce our emissions while growing our diversified economy.

Manitoba's efforts to reduce emissions associated with growth are showing results:

- In 1990, 620 kilotonnes (kt) of GHGs were emitted per billion of provincial gross domestic product (GDP).
- By 2010, emissions were reduced to 480 kt per billion of provincial GDP.
- The result is a 22 per cent improvement in emissions' intensity.

NOTE: All provinces, including Manitoba rely on Environment Canada's annual *National Inventory Report* (NIR) to track and report GHG emissions. The NIR is released 18 months after each reporting year. Environment Canada has released provincial emissions NIR data for the 2009 reporting year. The 2010 NIR will be released in the spring of 2012.

In the absence of actual emissions' estimates from Environment Canada, Manitoba Conservation and Water Stewardship's Climate Change Branch, with assistance from partner departments, has projected our provincial emissions using data provided by Statistics Canada, Environment Canada, Natural Resources Canada, Manitoba Hydro and the Manitoba government.



2.1 PROGRESS ON EMISSION REDUCTIONS ACHIEVED IN MANITOBA (2010)

Manitoba's 2008 climate change action plan outlined more than 60 action items to help reduce emissions across multiple sectors and adapt to climate change. Sectors covered in the plan include energy, transportation, agriculture, municipalities, businesses and public sector operations. Updates on these activities, to the end of 2010, are outlined in detail under *Sector Actions-Results to 2010,* starting on page 13.

NOTE: All carbon dioxide equivalent (CO_2e) units cited throughout this report are recorded in kilotonnes (kt). CO_2e units less than 10 kt are rounded to the nearest 0.1 Kt (ex: 6.8 kt). All other CO_2e units are rounded to the nearest kt (ex: 320 kt).

Climate change mitigation programs range in scale and scope. Some programs may have comparatively small emission reductions associated with them, yet provide important co-benefits including local economic development, ecosystem health, human health benefits and water quality improvements.

Programs and activities outlined in Manitoba's 2008 climate change action plan that achieved measurable GHG reductions in 2010 are displayed below.

PROJECT DESCRIPTION	2010 GHG REDUCTIONS*	2011 PROJECTED GHG REDUCTIONS*	2012 PROJECTED GHG REDUCTIONS*
Limited use of Manitoba Hydro's Brandon Unit #5 - coal fired facility (restricted by regulation)	350	340	270
Manitoba's Ethanol Mandate (8.5 per cent blend)	336	353	355
Manitoba's Biodiesel Mandate (2 per cent blend)	57	57	58
Manitoba Hydro's *Power Smart* programs - natural gas savings (estimated 59 million cubic metres of natural gas in 2010/2011)	112	116	140
Brandon Landfill Gas (LFG)	-	31	47
Brady Landfill Gas (LFG)	-	-	62
Manitoba Sustainable Agriculture Practices Program (MSAPP)	22	36	22
Climate Friendly Farm Woodlot Practices Program (CFWP)	2.9	2.7	2.8
Manitoba Incentives offered for geothermal installations	2.4	2.4	2.5
TOTAL(S)	**882**	**938**	**959**

*** all amounts in kilotonnes CO_2e**

2.2 | COMPARISON OF MANITOBA'S TOTAL EMISSIONS IN 2000 AND IN 2010

NOTE: For the chart titled "Manitoba's Projected Emissions by Sector (2010)" (shown on page opposite),

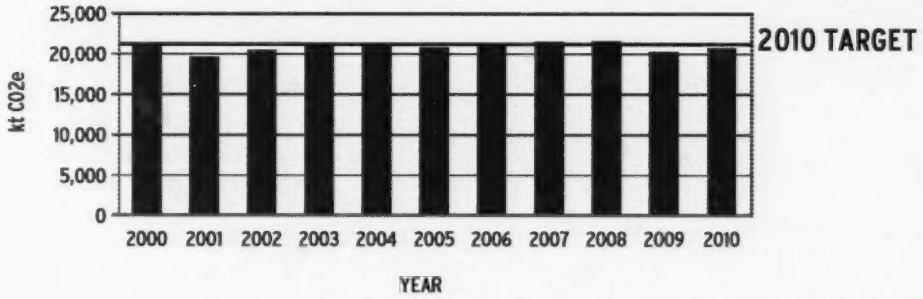
kt – *is the carbon dioxide equivalent (CO_2e) measurement in kilotonnes (1,000 tonnes equals one kilotonne)*

Agriculture – *includes enertic fermentation, manure management, agriculture soils and field burning of agricultural residues*

Energy: Stationary Combustion – *includes commercial, institutional and residential heating; electricity and heat generation; manufacturing; construction ; mining and oil and gas extraction; fossil fuel production and refining; and agriculture and forestry*

Emissions in the year 2000, compared to 1990, were up by 15 per cent. Our current projections are that Manitoba's emissions in 2010, as reported by Environment Canada, will be 20,776 kilotonnes (kt), approximately 459 kt (two per cent) lower than they were in 2000.

PROVINCIAL GHG EMISSIONS - 2000 TO 2010



2.3 | MANITOBA'S PROJECTED EMISSIONS IN 2010 (BY SECTOR)

Energy: Transportation – *includes road transportation (on and off-road vehicles - gasoline and diesel; propane and natural gas vehicles); railways; navigation (domestic marine); civil aviation (domestic aviation); and other transportation (pipelines)*

Fugitive Sources – *includes emissions from coal mining, oil and natural gas*

Industrial Processes – *includes mineral products, chemical industry and metal production; production and consumption of halocarbons and SF_6; and other and undifferentiated production*

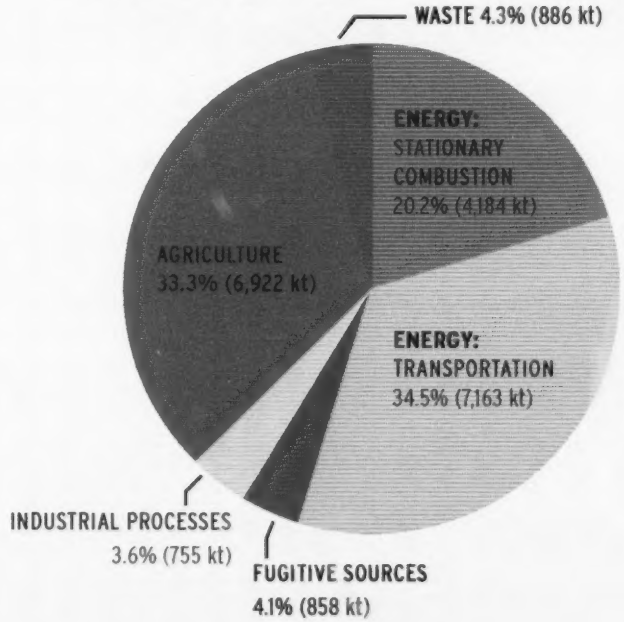
Solvents and Other – *includes emissions related to the use of N_2O as an anesthetic and propellant*

Waste – *includes solid waste disposal on land, wastewater handling and waste incineration*

On average, Manitoba contributes about three per cent of Canada's total GHG emissions. Our economic structure and rich hydro resources result in Manitoba having the lowest percentage of GHG emissions from stationary combustion sources within the energy sector (20.2 per cent) among all Canadian jurisdictions. As a result of our clean energy profile, emissions from agriculture and transportation are our largest two sources of emissions – comprising roughly one-third each.

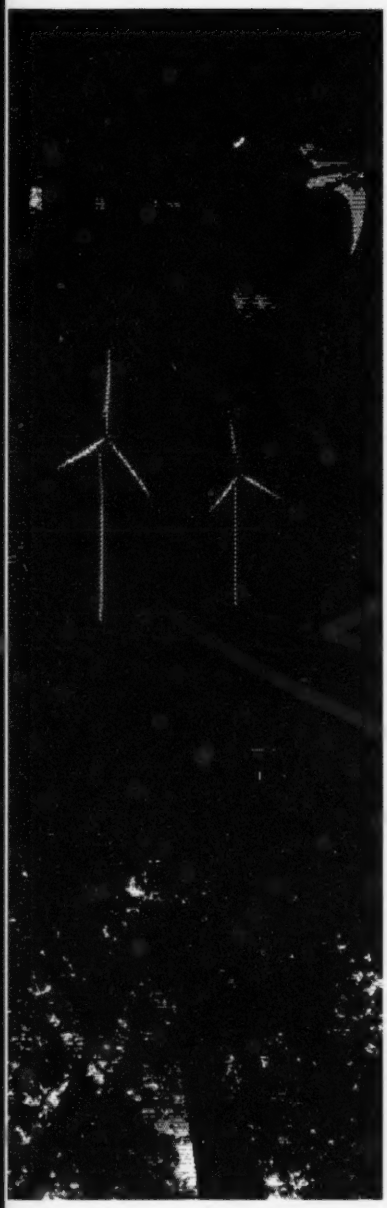
MANITOBA'S PROJECTED EMISSIONS BY SECTOR (2010)

Source: Manitoba Conservation and Water Stewardship, Climate Change Branch


WASTE 4.3% (886 kt)
ENERGY: STATIONARY COMBUSTION 20.2% (4,184 kt)
AGRICULTURE 33.3% (6,922 kt)
ENERGY: TRANSPORTATION 34.5% (7,163 kt)
INDUSTRIAL PROCESSES 3.6% (755 kt)
FUGITIVE SOURCES 4.1% (858 kt)

Note: "Solvents and Other" are not shown in the chart above. The projected Manitoba emissions for this sector in 2010 are 8 kt (0.0%).

2.4 | REDUCING EMISSIONS IN OTHER JURISDICTIONS



Manitoba Hydro produces virtually all its electricity from the natural power of water at its 14 hydroelectric generating stations. The abundance of Manitoba's water resources, combined with our hydro-power generating stations, allows Manitoba Hydro to emit practically no greenhouse gas (GHG) emissions. Hydropower, wind energy production and the electricity savings of its *Power Smart* programming all contribute to the export of clean electricity to help displace non-renewable sources of electricity in other jurisdictions such as coal and natural gas.

In 2010, Manitoba Hydro's net clean energy exports (exports less any imports) contributed to emission reductions in other jurisdictions of almost 7,200 kilotonnes (kt) of carbon dioxide equivalent (CO_2e). To put this into perspective, this is equivalent to 35 per cent of Manitoba's projected 2010 emissions. Since 1990, Manitoba Hydro has contributed to the displacement of more than 170,000 kt of CO_2e outside of the province.

Work is underway on the 200 megawatt (MW) Wuskwatim Generating Station. This project is being developed by Manitoba Hydro and the Nisichawaysihk Cree Nation. This low impact hydro project will be completed in 2012. The Wuskwatim Generating Station is estimated to contribute to emission displacements equivalent to approximately 1,000 kt of CO_2e annually.

A total of 63 wind turbines have been erected over a 93 square kilometre (km^2) area at St. Leon, Manitoba. One of the largest wind farms in Canada, St. Leon is capable of delivering 99 MW. Construction is moving forward on a 138 MW wind farm at St. Joseph, Manitoba. The project was commissioned for construction in 2010 and, when completed, will consist of 60 wind turbines covering 125 square kilometres (km^2). It will be the largest wind farm in the province. The turbines are expected to generate enough power to meet the needs of 50,000 homes.

Manitoba Hydro also displaces GHG emissions in other jurisdictions through its wind energy exports. The emissions reductions associated with wind are included in Manitoba Hydro's accounting of *Net Emissions Displaced from Exports* – these represent reduced or avoided emissions outside the province of Manitoba. In 2010, the wind farm in St. Leon is estimated to have contributed 260 kt in emission reductions. The contributions of wind are expected to grow by an additional 350 kt to a total of 610 kt annually following completion of the St. Joseph project.

2.5 | LAND USE AND FORESTRY

Manitoba's agricultural activities and vast forests result in significant net annual removals of GHGs. Manitoba's forests, wetlands and agricultural lands have sequestered an average of 5,000 kt of CO_2e since 1990. In 2008, the Land Use, Land-Use Change and Forestry (LULUCF) sector in Manitoba was responsible for removals of 9,500 kt of CO_2e. The LULUCF sector represents GHGs emitted and removed by soils, crops, forests and wetlands, and the changes to these land classifications. Currently, GHG emissions and removals in the LULUCF sector are reported by Environment Canada in the *National Inventory Report*, but are not included in national or provincial GHG totals.

The Manitoba government's *Trees for Tomorrow* program capitalizes on Manitobans' strong environmental stewardship ethic by giving landowners and organizations throughout the province the opportunity to plant seedlings. As a result, they can beautify their properties and increase property values, while reducing their greenhouse gas footprint. More trees mean a healthier atmosphere for people and communities. Once the trees under the program have completed their carbon dioxide (CO_2) sequestration role, large-scale landowners can harvest them and market the products to earn income.

2.6 | MANITOBA'S ACTIONS AND FUTURE EMISSION REDUCTIONS TO 2025

Manitoba Hydro is the province's major energy utility, providing electricity, natural gas and energy services, and programs across Manitoba. Energy efficiency is a fundamental goal underlying all areas of its business.

Manitoba Hydro's *Demand Side Management* initiative, *Power Smart*, consists of energy conservation and load management activities, designed to lower the demand for electricity and natural gas in Manitoba. This initiative is one element of the resource options available for meeting the province's electrical needs, and plays an important role in the corporation's overall integrated resource plan. The initiative reduces greenhouse gas emissions in two ways: directly – by reducing the amount of natural gas consumed in Manitoba, and indirectly – by allowing Manitoba Hydro to export surplus electricity. Electricity exports displace electricity generated by fossil fuel, which produces far more greenhouse gases than hydroelectric generation. Through *Power Smart*, Manitoba Hydro encourages residential, commercial, industrial and agricultural customers to save energy while saving millions of dollars on their electric bills.

The Manitoba government and Manitoba Hydro work together to support energy-efficient codes and standards. Through applying these codes and standards, the 2010 *Power Smart Plan* forecasts capacity savings of 183 MW; energy savings of 1,032 gigawatt-hours (GWh); and natural gas savings of two million cubic metres annually, by 2024/2025.

Combined with energy savings to date, the plan forecasts capacity savings of 273 MW, energy savings of 1,384 GWh and natural gas savings of two million cubic metres annually, by 2024/2025, through our energy efficient codes and standards. As a result of these savings, a GHG emissions reduction of 900 kt is expected by 2024/2025. (Source: Manitoba Hydro, 2010 *Power Smart Plan*).

Manitoba Hydro also considers efficiency opportunities in its internal operations. *Supply Efficiency Initiatives* optimize Manitoba Hydro's own use of electricity, and increase the production capability of existing facilities.

2.7 | CURRENT AND PREDICTED IMPACTS OF CLIMATE CHANGE IN MANITOBA

Scientific evidence shows that climate change is real and happening. Its wide-ranging impacts are now being felt across many regions of Canada. In Manitoba, temperatures are expected to rise by four to six degrees Celsius by end of this century; and we are expected to face an increased risk of water scarcity and variability in the future. Other impacts may include:

- Changes in precipitation and declines in ice and snow cover that will alter stream flows, resulting in an increased risk of flooding and erosion in spring and greater risk of droughts in summer. Extreme weather events including long-term drought, intense rain events and local summer flooding will be more frequent and severe.
- Warmer temperatures, especially in the north and during winter and spring, and increased precipitation in many areas across Manitoba will continue to affect the winter road network and resource-based sectors in the province.

- Southern Manitoba will likely experience more hot days and fewer cold days. This will result decreased heating costs and increased cooling costs. More heat-related illness may be experienced as a result.
- Warmer and longer growing seasons could foster growth and productivity for agriculture and forestry. However, these beneficial effects could be outweighed by more and prolonged droughts, more weeds, insect outbreaks and forest fires.
- Ecosystems, including forests and wetlands, will likely be altered, leading to changes in productivity, loss of plant and animal species, including moose and caribou.
- In northern Manitoba, changes in snow cover and sea-ice conditions, along with ecosystem impacts, will continue to affect access to traditional food supplies, while permafrost degradation and coastal erosion will also continue to affect community infrastructure.
- Extreme events such as heat waves, heavy rainfall, storms, fires and insect infestation may lead to human displacement, increased sickness and loss of life.

2.8 | MANITOBA'S CO-OPERATIVE EFFORTS WITH OTHER JURISDICTIONS

2.8.1 THE WESTERN CLIMATE INITIATIVE (WCI)

In June 2007, Manitoba joined the *Western Climate Initiative* (WCI). The central component of the WCI is a flexible, market-based, regional cap and trade program that caps greenhouse gas emissions and uses tradable permits to incent development of renewable and lower-polluting energy sources. In 2010, Manitoba consulted on using cap and trade as a tool for reducing GHG emissions.

2.8.2 NORTH AMERICA 2050 (NA2050) – A PARTNERSHIP FOR PROGRESS

Manitoba is participating in NA2050, a co-ordinated effort among US, Mexican and Canadian jurisdictions to design, promote and implement cost-effective policies that:

- reduce GHG emissions and create economic opportunities
- advocate for the most appropriate roles for federal, state and provincial governments
- achieve meaningful emission reductions
- demonstrate the economic and job-creation benefits of well-designed, climate change policies

The organization has its origins in the 3-Regions Collaborative, which began in 2009 as an effort to co-ordinate state and provincial representatives from the Regional Greenhouse Gas Initiative (RGGI), the WCI, and the Midwestern Greenhouse Gas Reduction Accord (MGGRA).

2.8.3 THE CLIMATE GROUP – DECLARATION OF FEDERATED STATES AND REGIONS

In 2005, The Climate Group teamed up with the provinces of Québec and Manitoba to hold the first Climate Leaders Summit. From this event came the *Montréal Declaration of Federated States and Regions*. The declaration was signed by sub-national governments from around the world, committed to setting targets and implementing climate-change actions in their own jurisdictions.

This international coalition has now convened a further three Climate Leaders summits. The most recent was in 2010 and coincided with the COP 16 negotiations in Cancun. Currently, sub-national leadership on climate change is not only generating much-needed emission reductions – it is also having a valuable political ripple effect. At the Climate Leaders Summit in Cancun, the sub-national governments in attendance showed their commitment to continue developing policies to deliver low-carbon development, by signing the *Cancun Statement of Federal States and Regional Governments on Low Carbon and Climate Resilient Development.*

2.8.4 THE CLIMATE REGISTRY (TCR)

Manitoba remains an active member of The Climate Registry (TCR), a non-profit organization that provides meaningful information to reduce GHG emissions. TCR establishes consistent, transparent standards throughout North America for businesses and governments to calculate, verify, and publicly report their carbon footprints in a single, unified registry.

2.8.5 PRAIRIES REGIONAL ADAPTATION COLLABORATIVE (PRAC)

The Prairies Regional Adaptation Collaborative (PRAC) is a joint undertaking of Alberta, Saskatchewan, Manitoba, Natural Resources Canada and the University of Regina. This initiative seeks to increase the capacity of decision-makers in integrating climate change adaptation into water resources management, terrestrial ecosystem management and drought and excessive moisture planning. This two-year initiative was launched in July 2010.

2.8.6 CANADA PARKS COUNCIL CLIMATE CHANGE ADAPTATION AND MITIGATION WORKING GROUP

The Parks and Natural Areas Branch of Manitoba Conservation and Water Stewardship is an active member of the Canada Parks Council Climate Change Adaptation and Mitigation Working Group. The goals of this group are to bring additional focus to the role of Canadian parks and protected areas in contributing ecosystem-based responses to climate change, inform climate change policy across jurisdictions, share information and best practices, and develop a framework to guide action on climate change among federal, provincial, and territorial parks and protected areas agencies.

3.1 | EXPANDING ENERGY EFFICIENCY

MANITOBA HYDRO'S *POWER SMART* PROGRAMS

DESCRIPTION AND RESULTS TO 2010

- *Power Smart* has been encouraging the efficient use of energy to residential, commercial and industrial customers since 1989. This includes Manitoba Hydro's *Lower Income Energy Efficiency Program* as well as the *Power Smart First Nation* program.
- *Power Smart* saved an estimated 1,238 kilotonnes (kt) of GHG emissions in 2010/2011 through its electrical energy savings by displacing emissions in other jurisdictions. An estimated 1,834 gigawatt-hours (GWh) in electricity savings was made in 2010/2011. (Source: Manitoba Hydro, Quarterly Power Smart Results)

CHANGES IN ENERGY CODE

DESCRIPTION AND RESULTS TO 2010

- 2010 – The *National Building Code of Canada 2010* was adopted by the Office of the Fire Commissioner (OFC), a special operating agency (SOA) of the Manitoba government.
- 2010 – The Manitoba government introduced improved safety and energy efficiency requirements that will become effective under the Manitoba Building Code Regulation and the Manitoba Plumbing Code of *The Buildings and Mobile Homes Act* on April 1, 2011.
- The OFC will adopt the *2011 National Energy Code of Canada for Buildings (NECB)*. It will provide minimum requirements for the design and construction of energy-efficient buildings, and will apply to new buildings and substantial renovations to existing buildings.

MINIMUM EFFICIENCY STANDARDS FOR NATURAL GAS FURNACES BY 2009

DESCRIPTION AND RESULTS TO 2010

- December 2009 – Manitoba Innovation, Energy and Mines implemented the Energy Efficiency Standards for Replacement Forced Air Gas Furnaces and Small Boilers Regulation under *The Energy Act*. This is the first regulation of its kind in Canada.
  - The regulation sets minimum annual fuel use efficiency standards for replacement gas furnaces and small boilers: 82 per cent for hot water gas boilers, 80 per cent for low pressure steam gas boilers and 92 per cent for replacement gas furnaces.

LOWER INCOME RESIDENTIAL EFFICIENCY PROGRAM (LIREP)

DESCRIPTION AND RESULTS TO 2010

- The *Lower Income Residential Efficiency Program (LIREP)* has provided qualifying, Manitoba, lower-income households with access to *Power Smart* and energy-efficient measures since December 2007.
  - LIREP is offered by the Manitoba government in collaboration with Manitoba Hydro. Two community-based, social enterprises – the *Building Urban Industries for Local Development (BUILD)* and the *Brandon Energy Efficiency Program (BEEP)* – assist in program delivery.

ecoENERGY RETROFIT – HOMES PROGRAM

DESCRIPTION AND RESULTS TO 2010

- The *ecoENERGY Retrofit – Homes Program* is a federal government initiative that provides grants for energy-saving home improvements while lowering greenhouse gas (GHG) emissions.
  - The program is delivering an average of three tonnes of GHG emissions savings per year per house.
  - More than 15,000 Manitoba families have benefited from residential energy-efficiency improvements as a result of this initiative. The average energy savings has been 24 per cent per household with an average *ecoENERGY* grant of $1,500 per home.
  - April 2010 to March 2011 – 6,213 Manitoba homeowners received Natural Resources Canada incentives for contributing to a healthier community by reducing their GHG emissions by 20 kilotonnes (kt).

ENERGY EFFICIENCY PILOT PROGRAM FOR FIRST NATIONS

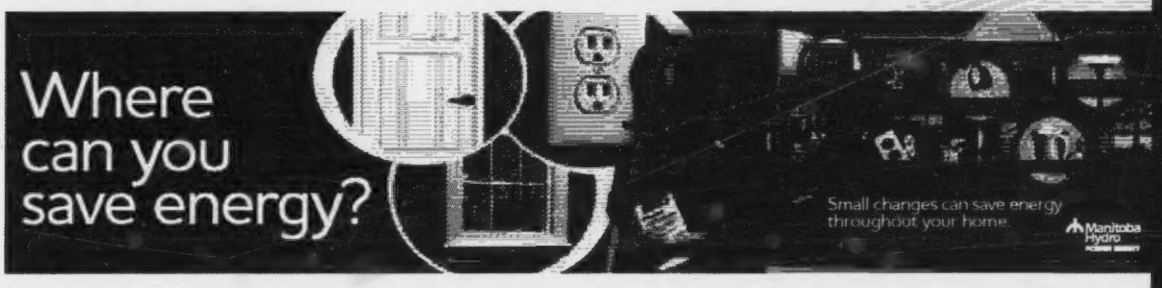
DESCRIPTION AND RESULTS TO 2010

- March 2008 – Work began on the Island Lake Energy Efficiency pilot program. The pilot was completed in June 2009, with 101 homes targeted in four communities: Garden Hill, St. Theresa Point, Red Sucker Lake and Wasagamack.

GREEN BUILDING POLICY

DESCRIPTION AND RESULTS TO 2010

- April 2007 – The Manitoba government introduced the *Green Building Policy for Government of Manitoba Funded Projects*. **(www.gov.mb.ca/mit/greenbuilding/requirements.html)**
  - Non-residential, capital building projects that receive provincial funds under the policy must incorporate green-building-specific processes, energy targets, environmental measures and reporting requirements.
  - The policy will be expanded in the future to include residential projects, existing buildings and leased accommodations.
  - The policy currently applies to the new construction of government owned buildings, corrections facilities, schools, colleges and universities, health facilities and provincially funded building projects such as community recreation centres and cultural institutions. It will be expanded in future to include residential projects, existing buildings and leased accommodations.
  - Regulations focusing on energy-performance targets for new construction are under development by Manitoba Infrastructure and Transportation; and Manitoba Conservation and Water Stewardship. They are expected to come into force in 2013.



3.2 | EXPANDING GREEN ENERGY (GEOTHERMAL POWER, SOLAR HEATING AND BIOFUELS)

INCENTIVES OFFERED FOR GEOTHERMAL INSTALLATIONS

DESCRIPTION AND RESULTS TO 2010

- January 1, 2009 – Manitoba Innovation, Energy and Mines launched the *Manitoba Geothermal Energy Incentive Program* (MGEIP), which offers incentives to residential and commercial building owners for installing geothermal heat-pump systems.
  - Incentives include:
    - provincial grants for new houses in natural-gas service areas
    - provincial grants for district geothermal systems
    - a *Green Energy Equipment Tax Credit*
- Approximately 500 Manitobans have received financial support from the government of Manitoba.
- Since 2002, Manitoba Hydro's *Earth Power* loan program has given residential customers the option to finance the installation of a geothermal system in their homes.
  - Approximately 1,134 Manitoba homeowners have accessed the loan program from 2002 to the end of 2010/2011.
- Since 2006, Manitoba Hydro's *Commercial Geothermal Program* has offered financial incentives to customers who install geothermal heat pumps to offset conventional electric heating systems in existing commercial buildings.
  - Approximately 96 commercial customers have participated in this program to the end of 2010/2011.

ASSISTANCE FOR MANITOBA GEOTHERMAL ENERGY ALLIANCE (MGEA)

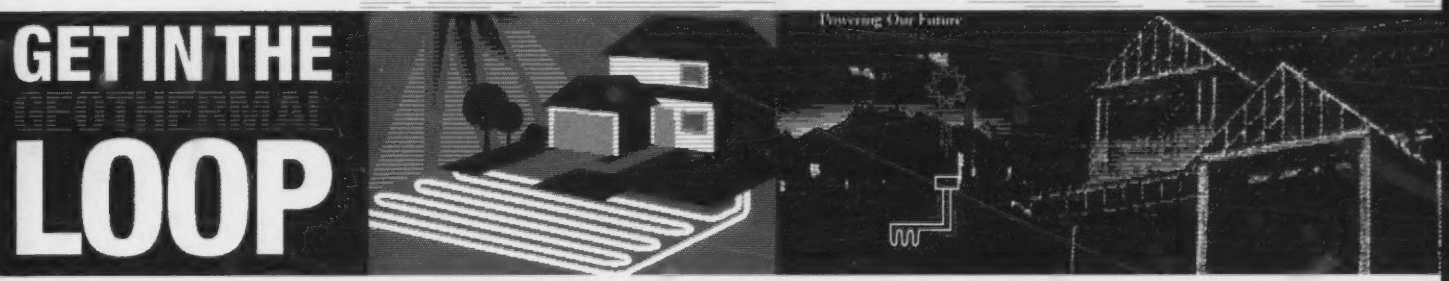
DESCRIPTION AND RESULTS TO 2010

- 2008 to 2010 - Manitoba Innovation, Energy and Mines provided $327,500 to help the *Manitoba Geothermal Energy Alliance (MGEA)* industry association design and develop an industry-driven, quality assurance program. The MGEA has completed that program.

INTENSIFY PROVINCE'S COMMITMENT TO GEOTHERMAL ENERGY

DESCRIPTION AND RESULTS TO 2010

- Renewable, low or zero-carbon energy sources and systems, such as geothermal energy, are identified as a preference for new buildings, under Manitoba's *Green Building Policy for Government of Manitoba-funded Projects.*
- Manitoba Innovation, Energy and Mines and the Forks Renewal Corporation fund an educational geothermal kiosk, located with the innovative geothermal system at the Forks Market. The interactive kiosk helps with the expansion of green heat through the education and demonstration of geothermal heating and cooling.
- Manitoba Innovation, Energy and Mines has a monitoring study underway to evaluate the field performance of advanced, low-temperature, air-source heat pumps in Manitoba.



FAIR PROPERTY ASSESSMENT FOR GEOTHERMAL INSTALLATIONS

DESCRIPTION AND RESULTS TO 2010

- January 1, 2009 – a property tax assessment exemption for geothermal earth loops (a geothermal system that lies below the ground, outside the building) serving single-family residences, came into effect. This exemption ensures users of the technology are treated fairly compared to those who use conventional heating and cooling energy sources.

SUPPORT FOR SOLAR HEATING

DESCRIPTION AND RESULTS TO 2010

- 2009 – The *Green Energy Equipment Tax Credit* was extended to solar thermal energy systems. Eligible solar heating installations include equipment used for heating air or water in homes and commercial buildings.
- The *Residential Earth Power Loan* for solar water heaters, offered by Manitoba Hydro, provides financial assistance for the installation of solar water heating systems for residential water tanks.

EXPANDING BIOFUEL PRODUCTION

DESCRIPTION AND RESULTS TO 2010

ETHANOL

- January 1, 2008 – Manitoba's ethanol sales mandate began. The mandate requires fuel suppliers in Manitoba to replace at least 8.5 per cent of their gasoline available for sale with ethanol. Approximately 140 million litres of ethanol are used in Manitoba each year.
- 2008 to 2015 – The Ethanol Fund Grant Regulation under *The Biofuels Act* provides for a portion of gas tax revenue to be credited to an Ethanol Fund Grant. The eight-year grant provides financial support for ethanol manufacturers in Manitoba.
- 2010 GHG Reductions – in kilotonnes (kt)
  - 336 kt (ethanol)

BIODIESEL

- November 1, 2009 – Manitoba's Biodiesel Mandate Regulation under *The Biofuels Act* came into effect. It's the first regulation of its kind in Canada. The regulation requires an average of two per cent biodiesel in annual diesel fuel sales. Manitoba's biodiesel mandate requires a minimum of 20 million litres of biodiesel be used per year.
- 2010 to 2015 – The Biodiesel Fund Grant Regulation under *The Biofuels Act* is a five-year grant program that provides an incentive of 14 cents per litre of biodiesel to support biodiesel production Manitoba. The program started April 1, 2010 and ends March 31, 2015.
- Manitoba currently has three licensed, commercial biodiesel producers located in Winnipeg, Arborg and Beausejour. The three biodiesel plants have the capacity to produce more than 30 million litres annually. Manitoba farmers are one of the largest users of biodiesel. Increased uptake in the future will further reduce emissions.
- 2010 GHG Reductions – in kilotonnes (kt)
  - 57 kt (biodiesel)

NEW HYDROPOWER

DESCRIPTION AND RESULTS TO 2010

- Work is underway on the 200 megawatt (MW) Wuskwatim Generating Station. This project is being developed by Manitoba Hydro and the Nisichawaysihk Cree Nation. This low impact hydro project will be completed in 2012. The Wuskwatim Generating Station is estimated to displace emissions equivalent to approximately 1,000 kilotonnes (kt) of carbon dioxide equivalent (CO_2e) annually.

WIND POWER

DESCRIPTION AND RESULTS TO 2010

- 2010 - 138 megawatt (MW) wind project located at St. Joseph, Manitoba was commissioned for construction. It was completed in March 2011.
  - The wind farm at St. Joseph includes 60 wind turbines covering 125 square kilometres (km^2) and is expected to generate enough power to serve the needs of 50,000 homes. This is in addition to the 63 wind turbines operating in the St Leon area.
  - The emissions reductions associated with wind are included in Manitoba Hydro's accounting of *Net Emissions Displaced from Exports*. In 2010, energy from the wind farm in St. Leon is estimated to have contributed to emission reductions of 260 kilotonnes (kt). The annual contributions of wind are expected to grow by an additional 350 kt following completion of the 138 MW project at St. Joseph, Manitoba.

DEVELOPMENT FOR OFF-GRID COMMUNITIES

DESCRIPTION AND RESULTS TO 2010

- June 2009 - Manitoba Hydro completed a report on *Recommendations for Reducing or Eliminating the Use of Diesel Fuel to Supply Power in Off-Grid Communities* fulfilling requirements of *The Climate Change and Emissions Reductions Act.*
- In 2011, Manitoba Hydro will begin a study to evaluate the use of community-sized, wind energy turbines, as part of a larger program for off-grid communities.

BIOENERGY OPTIMIZATION PROGRAM DEMONSTRATION PROJECTS

DESCRIPTION AND RESULTS TO 2010

- Manitoba Hydro is showcasing five biomass-to-energy pathways (Pyrolysis Oil, Synthesis Gas, Waste Heat, Biogas and Biocarbon) for converting raw sources of biomass inputs to useful energy outputs. These five demonstration projects, installed at customer sites across Manitoba, are part of the corporation's comprehensive *Power Smart Bioenergy Optimization Program*, intended to encourage and facilitate the installation, operation, and maintenance of customer-sited load displacement generation systems using combined heat and power (CHP) systems and renewable fuels, specifically biomass.
  - The program is forecast to save 9.73 megawatts (MW) and 77.75 gigawatt-hours (GWh) of electricity, 3.83 million cubic metres in natural gas and 66 kilotonnes (kt) in carbon dioxide emissions by 2018/2019. The demonstration projects are being co-funded through the Government of Canada's *Clean Energy Fund.*

CENTRE FOR EMERGING RENEWABLE ENERGY INC.

DESCRIPTION AND RESULTS TO 2010

- September 2010 - Manitoba Innovation, Energy and Mines completed the transition of the Hydrogen Centre of Expertise Inc. to the Centre for Emerging Renewable Energy Inc., a fully independent, non-profit organization. The new centre has broadened its mandate to include a range of emerging renewable energies and associated technologies.

3.4 | MOVING TO A COAL-FREE MANITOBA

NEW REGULATION TO RESTRICT USE OF THE COAL-FIRED ELECTRICAL GENERATING STATION IN BRANDON

DESCRIPTION AND RESULTS TO 2010

- January 1, 2009 – The Coal-Fired Emergency Operations Regulation came into effect under *The Climate Change and Emissions Reductions Act*. This regulation restricts Manitoba Hydro's use of coal to generate power to emergency operations. Manitoba Hydro's, last remaining coal-fired facility is located at Brandon Unit #5 in Brandon, Manitoba.
- 2010 GHG Reductions – in kilotonnes (kt)
  - Prior to this regulation being in place, the Brandon facility emitted approximately 400 kilotonnes (kt) of GHG emissions per year on average; with fluctuating periods of high/low operation intensity. Under the new regulation, the facility's annual GHG emissions will typically be less than 130 kt in the absence of long-term emergency circumstances such as drought.

INTRODUCE A COAL REDUCTION STRATEGY AND A NEW COAL TAX

DESCRIPTION AND RESULTS TO 2010

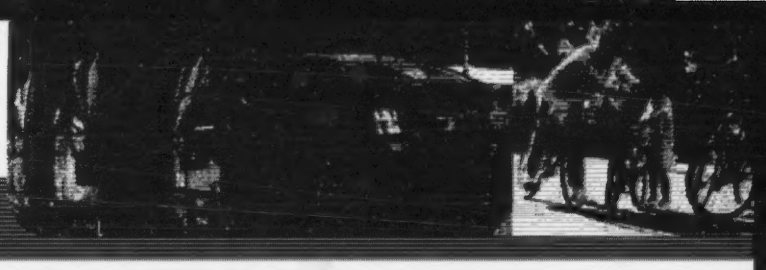
- 2010 – The Manitoba government announced it would implement *The Emissions Tax on Coal Act* under *The Budget Implementation and Tax Statutes Amendment Act, 2011*.
  - The new emissions tax on coal used in Manitoba will become effective January 1, 2012 and will comprise a $10 per tonne of carbon dioxide equivalent (CO_2E) emissions.
  - The tax will be based on the grade of coal and will be payable by those who purchase more than one tonne of coal per year for use in Manitoba.

3.5 | BECOMING THE CONTINENT'S LOWEST CARBON LEADER

NEW ENERGY STRATEGY

DESCRIPTION AND RESULTS TO 2010

- The development of a new provincial energy strategy is currently underway and being led by Manitoba Innovation, Energy and Mines.



4.1 | DRIVING GREEN

SUPPORTING SUSTAINABLE TRUCKING PRACTICES (GrEEEn TRUCKING PROGRAM)

DESCRIPTION AND RESULTS TO 2010

- September 2009 – The *GrEEEn* (economically and environmentally efficient) *Trucking Program* (**www.greeentrucking.ca**) was launched to provide incentives to Manitoba's commercial trucking industry for installing various emission-reduction technologies.
  - Under the program, companies are eligible for rebates of up to 25 per cent, to a maximum of $2,500 per unit, per tractor or trailer.
  - The key objectives of the *GrEEEn Trucking Program* are to:
    - support job growth and contribute to a healthy provincial economy
    - promote technology and innovation as a way to reduce greenhouse gas (GHG) emissions in the transportation industry
    - help the private sector implement GHG emission reduction technologies, through financial incentives
  - The program is offered by Manitoba Infrastructure and Transportation in partnership with the Manitoba Trucking Association and the University of Manitoba Transport Institute.
  - In 2010, 38 trucking companies received $225,000 in funding for technology upgrades made to more than 100 truck units and 38 trailers.
- 2010 GHG Reductions – in kilotonnes (kt)
  - 1.5 kt (estimated)

DRIVE GREENER (ecoDRIVER MANITOBA)

DESCRIPTION AND RESULTS TO 2010

- 2009 to 2010 – Green Manitoba, a special operating agency (SOA) of the Manitoba government, partnered with the Green Action Centre and the Climate Change Connection to develop the *Drive Greener Manitoba* program. The program received funding from Natural Resources Canada, and was designed to encourage behaviour change through public education and outreach. It also included a technical component, delivered in partnership with the Centre for Sustainable Transportation.
- Manitoba Public Insurance (MPI) provided support to this program through sponsorship/production of media efforts (60-Second Driver television segments), a website, Freeze Frame (International Film Festival for Kids) competition and the provision of facilities for vehicle maintenance clinics.

VEHICLE STANDARDS ADVISORY BOARD (VSAB)

DESCRIPTION AND RESULTS TO 2010

- September 2008 – The Vehicle Standards Advisory Board (VSAB) was established – as required by *The Climate Change and Emissions Reductions Act* (CCERA) – to provide recommendations to help the province develop appropriate, vehicle-emission standards.
- January 30, 2009 – VSAB delivered its recommendations in a report (**www.gov.mb.ca/conservation/climate/pdf/vsab_report.pdf**), following consultation with stakeholders, experts and other jurisdictions.

MANITOBA HYBRID ELECTRIC VEHICLE REBATE PROGRAM

DESCRIPTION AND RESULTS TO 2010

- October 2010 – The Manitoba government's $2,000 *Hybrid Electric Vehicle Rebate Program* was replaced by an incentive to remove older (pre-1995), high-polluting vehicles from the roads. The original rebate program was launched in 2007, and provided approximately 1,600 incentives to program applicants – an average of 400 per year.

MANITOBA VEHICLE SCRAPPAGE PROGRAM

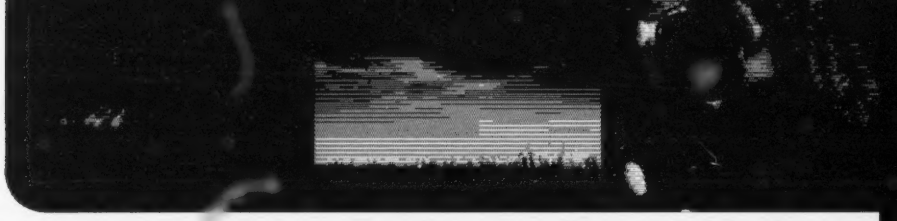
DESCRIPTION AND RESULTS TO 2010

- 2010/2011 – Green Manitoba, a special operating agency (SOA) of the Manitoba government, partnered with the Lung Association of Manitoba to deliver the Manitoba government's *Vehicle Scrappage Program.*
  - 1,726 older, high-emitting vehicles were scrapped.
  - Manitoba motorists received $440 as a result of Manitoba's $140 per vehicle top-up of the federal government's *Retire Your Ride Program,* delivered by the Lung Association of Manitoba.
- October 2010 – In a continued effort to improve the efficiency of Manitoba's private fleet, Manitoba Public Insurance (MPI) stopped auctioning off pre-1995 vehicles written off through the regular claims process.
- 2010 GHG Reductions – in kilotonnes (kt)
  - 2.3 kt

EXPANDING UPTAKE OF LOW AND ZERO EMISSION VEHICLES

DESCRIPTION AND RESULTS TO 2010

- September 2008 to September 2011 – The *Manitoba Plug-in Hybrid Vehicle (PHEV) Demonstration* was initiated in 2008 to test vehicles under real-life conditions and set the stage for broader adoption. The three-year project, funded by the Manitoba government, will end in 2011.
  - 10 Toyota Prius vehicles were converted for the demonstration, primarily by automotive instructional staff at Red River College. Five vehicles were provided by the Vehicle and Equipment Management Agency (VEMA), a special operating agency (SOA) of the Manitoba government; two vehicles by Manitoba Hydro; two vehicles by Manitoba Public Insurance (MPI); and one vehicle by the City of Winnipeg.
  - All vehicles have been operating in public-sector fleets in the Winnipeg vicinity.
  - The demonstration is being administered by the non-profit Centre for Emerging Renewable Energy Inc. (CERE). Performance monitoring of the converted vehicles will continue for three years, until September 2011.
- July 2010 – A plug-in partnership was announced involving the Manitoba government, Manitoba Hydro and the University of Manitoba, together with Toyota Canada, for the year-long testing of Toyota's pre-production model of the Prius plug-in hybrid vehicle (PHV).
- September 2010 – The University of Winnipeg, Manitoba Innovation, Energy and Mines, and Manitoba Infrastructure and Transportation announced a partnership to conduct a demonstration at the university's downtown campus. The demonstration explores the potential benefits of using a low-speed, electric utility vehicle. A specific objective of this low-speed vehicle (LSV) demonstration is to help develop regulations governing their potential use in Manitoba.
- December 2010 – The Manitoba government signed a memorandum of understanding (MOU) with Mitsubishi Heavy Industries to facilitate further development of renewable energy.



5.1 | EXPANDING SUSTAINABLE FARMING PRACTICES

MANITOBA SUSTAINABLE AGRICULTURE PRACTICES PROGRAM (MSAPP)

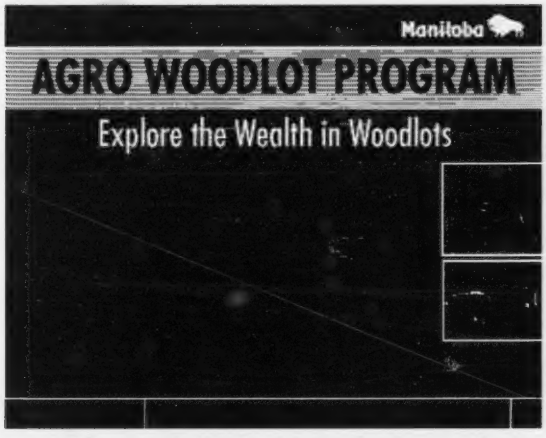
DESCRIPTION AND RESULTS TO 2010

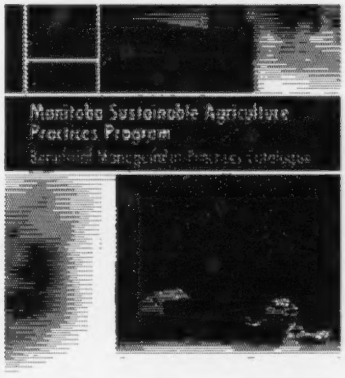
- September 15, 2009 – The *Manitoba Sustainable Agriculture Practices Program* came into effect. It provides funding and technical assistance to carry out sustainable agriculture projects on climate change.
  - Funding for projects is available for three fiscal years: 2009/2010, 2010/2011, and 2011/2012.
- 2010 GHG Reductions – in kilotonnes (kt)
  - 22 kt of carbon dioxide equivalent (CO_2e) emissions

CLIMATE FRIENDLY FARM WOODLOT PRACTICES (CFWP)

DESCRIPTION AND RESULTS TO 2010

- The *Climate Friendly Farm Woodlot Practices (CFWP)* program was designed to enhance carbon sequestration and ecological resilience by rejuvenating woodlots, and to stimulate rural economic development and bioenergy crop options in Manitoba.
  - The Manitoba government provided extension services to farm producers to implement sustainable woodlot management and build capacity for bioenergy production.
  - Under *CFWP*, 50 landowners sustainably harvested 652 acres of their total 7,873 woodlot acres. This is equal to the continued storage of 387 kilotonnes (kt) of carbon dioxide equivalent (CO_2e) emissions.
  - Direct payments were provided to producers to implement best management practices (BMPs) supporting environmentally sensitive logging and regeneration. The program also provided training to micro-forestry entrepreneurs to minimize the environmental impacts of logging and maximize economic returns.
  - A total of 27 logging BMP projects were conducted on 127 acres. As well, 204 people were trained at 22 workshops, 42 of whom were qualified to deliver environmentally sensitive BMPs grants. BMP grants increased landowner interest in harvesting by 48 per cent. Two landowners protected 206 acres under Conservation agreements.
- 2010 GHG Reductions – in kilotonnes (kt)
  - 2.9 kt of carbon dioxide equivalent (CO_2e)
  - 209 kt potentially sequestered on 4,314 acres





TREES FOR TOMORROW

DESCRIPTION AND RESULTS TO 2010

- 2008 – The Manitoba government launched *Trees for Tomorrow Program* in 2008 as part of the province's plan to reduce greenhouse gas (GHG) emissions. The program contributes to the United Nations' *Billion Tree Campaign* and also offsets local carbon emissions that contribute to climate change.
  - Most of the seedlings are grown at the Manitoba government's Pineland Forest Nursery in Hadashville, Manitoba. The Manitoba Forestry Association assists in the delivery of the program.
  - The program benefits Manitoba by helping to:
    - extract large amounts of carbon dioxide (CO_2) from the air
    - reduce GHG emissions
    - reduce soil erosion and increase wildlife habitat
    - build on public education through instruction on forest care, sustainability and proper forest management
  - 2008 to 2010 – A total of 2,449,183 trees were planted.
  - 2011 – A total of 4,100,000 seedlings and cuttings will be distributed and planted by more than 2,000 people and organizations who applied to the program.
  - 2012 – A target of 1.9 million seedlings is planned for 2012, with a final, revised, total program target of six million trees planted over five years. These trees will continue to sequester carbon long after the planting component of the program is completed in 2012/2013.
- 2010 GHG Reductions – in kilotonnes (kt)
  - 2010/2011 – A total of 4.6 kt is expected to be reduced.
  - 2012/2013 – A cumulative total of 10 kt is expected to be reduced.

MANITOBA CROP RESIDUE BURNING PROGRAM (CRBP)

DESCRIPTION AND RESULTS TO 2010

- The *Manitoba Crop Residue Burning Program (CRBP)* has been in operation since the fall of 1993 and is managed by Manitoba Agriculture, Food and Rural Initiatives' (MAFRI's) Crops Knowledge Centre. The program is regulated under the Burning of Crop Residue and Non-Crop Herbage Regulation and enforced by Manitoba Conservation and Water Stewardship.
- The CRBP provides a comprehensive approach to address the issue of burning crop residue (burning straw, stubble or chaff from any crop or the remains of any unharvested crop) and the resulting GHG emissions, air quality issues, human health concerns and farm crop management challenges that arise from this practice. This program also provides alternatives to burning, such as using crop residue to produce biomass energy.
- In all areas of the province, the majority of farmers do not burn crop residue; only an estimated five per cent of producers in the province actually burn excess straw.

MANURE MANAGEMENT FINANCIAL ASSISTANCE PROGRAM (MMFAP)

DESCRIPTION AND RESULTS TO 2010

- Manitoba Agriculture, Food and Rural Initiatives introduced a new financial assistance program to help with manure management in the spring of 2011.
- The *Manure Management Financial Assistance Program (MMFAP)* will help hog Manitoba producers with the cost of building or repairing manure storage structures, and adopting manure treatment systems, which will help them protect our water and reduce soil phosphorus on their land.

ODOUR CONTROL TAX CREDIT

DESCRIPTION AND RESULTS TO 2010

- Since 2006, agricultural land owners have been eligible for a new *Odour Control Tax Credit* to offset 10 per cent of the purchase price of eligible odour control equipment that may reduce methane emissions.
  - Equipment includes manure storage covers and anaerobic digesters.
  - The tax credit is administered by the Canada Revenue Agency on behalf of Manitoba Finance.

MANITOBA ORGANIC TRANSITION PROGRAM (MOTP)

DESCRIPTION AND RESULTS TO 2010

- April 1, 2008 – Manitoba Agriculture, Food and Rural Initiatives established an office specializing in organic farming support.
- 2008 to 2011 – Funding support under the *Manitoba Organic Transition Program (MOTP)* was introduced in 2008 to help producers with the costs of moving from conventional to organic food production. The program ended in March 2011.
- 2010/2011 – MOTP was used by 44 organic operators (producers and processors) involving 26,065 acres of land.
- 2010 GHG Reductions – in kilotonnes (kt)
  - 5.9 kt of carbon dioxide equivalent (CO_2e) reduced, or 1.6 kt of carbon (sequestered)

5.2 | SUPPORTING LOCAL DISTRIBUTION

GRASSROOTS INITIATIVES

DESCRIPTION AND RESULTS TO 2010

- Grassroots initiatives, including the 100-Mile Diet (**www.100milemanitoba.org**), encourage people to eat food grown within a 100-mile radius of where they live. The 100-Mile Diet and associated campaigns have been funded by the *Manitoba Climate Change Action Fund (MCCAF)*. This fund was established in January 2001 as part of the Manitoba government's climate change action plan.

PEMBINA REGION LOCAL FOOD DISTRIBUTION NETWORK

DESCRIPTION AND RESULTS TO 2010

- In the Pembina region, Manitoba Agriculture, Food and Rural Initiatives has initiated a local, food distribution network. It consists of a group of producers and processors who are examining the benefits of forming a distribution co-operative to enhance local food distribution.

LOCAL FOOD SUPPLIERS LISTING FOR MANITOBA CONSUMERS

DESCRIPTION AND RESULTS TO 2010

- October 2010 – Manitoba Agriculture, Food and Rural Initiatives launched *The Buy Manitoba Program*. It is part of a five-year program to develop a branding and public-awareness campaign to help consumers identify and buy locally. This industry-led program is guided by an expert steering committee, which includes members from all steps of the food-value chain, including retail and food-service partners.
  - For Manitoba consumers who want to buy locally grown and processed foods, annual guides to local food suppliers are available at all MAFRI GO offices and online at **www.gov.mb.ca/agriculture/consumer/buymanitoba.html**.

5.2 | SUPPORTING LOCAL DISTRIBUTION

NORTHERN HEALTHY FOODS INITIATIVE (NHFI)

DESCRIPTION AND RESULTS TO 2010

- The *Northern Healthy Foods Initiative (NHFI)* is managed by Manitoba Aboriginal and Northern Affairs.
  - The program is designed to create healthier local food systems by setting up food self-sufficiency initiatives, such as gardening, greenhouses, composting awareness and the *Revolving Loan Freezer Purchase Program.*
  - The NHFI Management Committee oversees the initiative and provides assistance and guidance to program participants. The committee is made up of representatives from various Manitoba government departments and agencies, including: Manitoba Health; Manitoba Healthy Living, Youth and Seniors (now "Manitoba Healthy Living, Seniors and Consumer Affairs. For Youth, now part of Manitoba Children and Youth Opportunities); Healthy Child Manitoba; Manitoba Agriculture, Food and Rural Initiatives; Manitoba Conservation and Water Stewardship; and Manitoba Aboriginal and Northern Affairs.
  - 2007 to 2010 – NHFI received funding from the *Manitoba Climate Change Action Fund (MCCAF).* This fund was established in January 2001, as part of the Manitoba government's climate change action plan.
    - 17 greenhouses were supported and 312 energy-efficient freezers were distributed
    - approximately 320 gardens were planted (in 2009) and over 549 were planted (in 2010)
  - The NHFI helped decrease dependence on air and road freight (all-weather and winter), and reduce greenhouse gas (GHG) emissions and store-bought packaging waste.

5.3 | ON-FARM ENERGY

AGRI-ENERGY DEVELOPMENT

DESCRIPTION AND RESULTS TO 2010

- The development of environmentally sustainable, energy production practices to support Manitoba's agricultural and rural economy is ongoing.
- 2010 – The first of three to four farm-size wind turbines, planned for installation on rural sites as demonstration units, was installed.
- Biogas production for heat and power, generated from anaerobic digestion systems, has been tested at the University of Manitoba and on several farm sites. Support is also being provided to improve solid-liquid separation at a dairy farm.

PROVINCIAL FUNDING FOR BIOMASS ENERGY

DESCRIPTION AND RESULTS TO 2010

- Manitoba Agriculture, Food and Rural Initiatives is pursuing funding to support biomass energy development in Manitoba. A biomass energy support program, which has been approved in principle, will provide financial assistance to coal users to transition to biomass, and to biomass processors to establish new, or expand existing, production capacities.

BIOMASS DEVELOPMENT

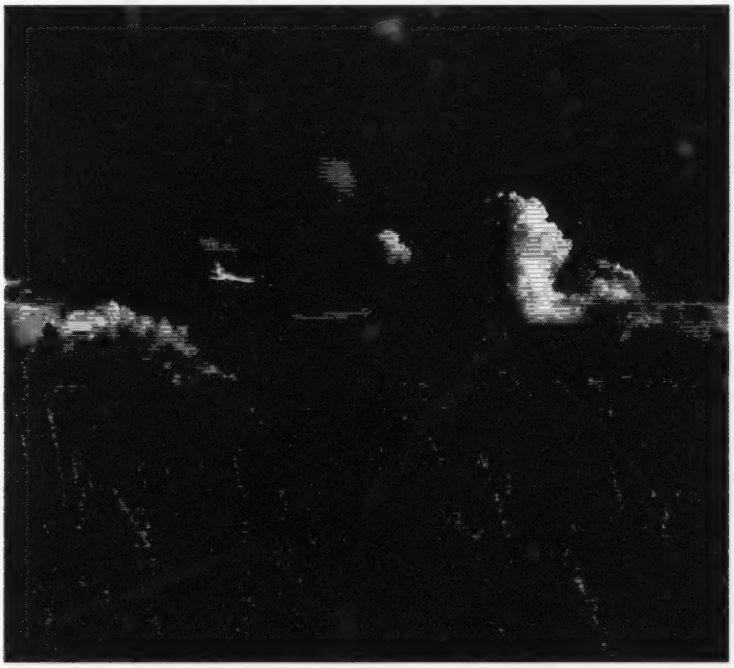
DESCRIPTION AND RESULTS TO 2010

- Manitoba Agriculture, Food and Rural Initiatives' (MAFRI's) Agri-Energy Office is working with producers to develop opportunities for the use of biomass energy. MAFRI has supported studies to address biomass availability and procurement issues, and reports have been shared with biomass developers.
- The Prairie Agricultural Machinery Institute (PAMI) is an agricultural resource for farmers and the agri-business sector in areas such as crop research and agricultural equipment design and development.
  - PAMI's newly developed, mobile, biomass densifier is being tested on fields of wheat straw, prior to commercialization. A number of farm operations, businesses and greenhouses have already switched, or are switching, to biomass burners. This is creating additional demand for things like flax shives, crop residues and wood waste and reducing demand for fossil fuels.

BIOPRODUCTS STRATEGY

DESCRIPTION AND RESULTS TO 2010

- In 2009, the Manitoba government commenced development of a strategy for the bioproducts industry. The strategy was launched early in 2011 to provide opportunities for a sustainable, rural, bio-economy. Priority areas include biomass production/supply, bioenergy/biofuels, biofibre/biomaterials and biochemicals.
- An implementation framework has also been established as part of this strategy. Manitoba Agriculture, Food and Rural Initiatives is representing the province on a federal-provincial-territorial (FPT) working group to develop a national bioproducts strategy.



6.1 | CLIMATE-FRIENDLY PLANNING

PROVINCIAL LAND USE POLICIES

DESCRIPTION AND RESULTS TO 2010

- A review of the *Provincial Land Use Policies (PLUPs)* began in 2006. The Manitoba government continues to update provincial land use policies on an ongoing basis to ensure local development plans, and land use and development decisions, reflect Manitoba's climate change mitigation and adaptation objectives.

6.2 | EXPANDING COMMUNITY-BASED ACTION

WASTE REDUCTION AND RECYCLING SUPPORT PROGRAM (WRARS)

DESCRIPTION AND RESULTS TO 2010

- July 1, 2009 – The Manitoba government introduced a new $10-per-tonne landfill levy, along with a province wide *Waste Reduction and Recycling Support Program* (*WRARS*).
  - *WRARS* provides support and incentives to municipalities and local government districts for recycling and waste management, including electronic waste and household hazardous waste management.
  - *WRARS* is administered by Green Manitoba, a special operating agency (SOA) of the Manitoba government.

PROVINCIAL LANDFILL GAS (LFG) MANAGEMENT AND MITIGATION STRATEGY

DESCRIPTION AND RESULTS TO 2010

- Under *The Climate Change and Emissions Reductions Act*, owners or operators of prescribed landfills must submit an assessment of the potential for mitigating emissions generated at the landfill. This also includes a plan for monitoring, controlling, collecting or using greenhouse gas (GHG) emissions before they are released.
  - September 2010 – Brandon's Eastview Landfill received an initial contribution of $854,000, out of a total contribution of $1.275 million from the Manitoba government to construct its LFG capture system. The system was commissioned in May 2011 and is expected to reduce up to 50 kilotonnes (kt) of GHG emissions annually.
  - 2011 – The City of Winnipeg is planning to proceed with a project to capture methane from the Brady Road Landfill. The Manitoba government has committed $2.55 million in funding for the project. The system is expected to be commissioned in the fall of 2012 and will reduce up to 62 kt of GHG emissions that year.

COMMUNITY LED EMISSIONS REDUCTION (CLER) PROGRAM

DESCRIPTION AND RESULTS TO 2010

- 2008 – The Manitoba government started the *Community Led Emissions Reduction (CLER)* program.
  - *CLER* provides tools and resources to help municipalities, individuals, businesses, and institutions, plan and act to reduce GHG emissions, and to make more sustainable, long-term decisions.
  - The four-year pilot program is delivered by Manitoba Local Government in partnership with 12 Manitoba municipalities and six community organizations in Winnipeg, the Capital region and Brandon.
  - All participants are required to report on emission reductions achieved and other economic, social and environmental benefits by January 31, 2012.
  - Municipalities have set a corporate reduction target of 20 per cent below 2003 levels by 2013, and a community target of six per cent below 2003 levels by 2013. Community organizations have set a target of reducing 0.75 tonnes per capita by 2013.
- 2010 GHG Reductions – in kilotonnes (kt)
  - 2010 (estimated) – 0.7 kt of carbon dioxide equivalent (CO_2e) reduced
  - 2020 (projected estimate) – 1.3 kt of CO_2e reduced
  - 2025 (projected estimate) – 1.3 kt of CO_2e reduced

NEIGHBOURHOODS ALIVE! NEIGHBOURHOOD RENEWAL FUND

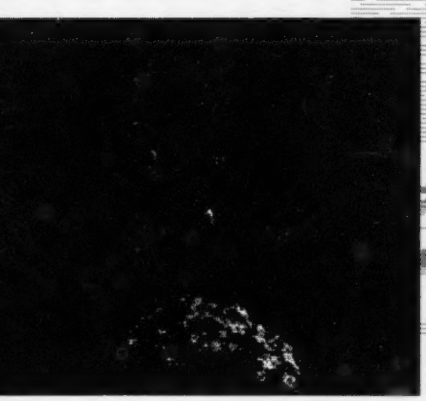
DESCRIPTION AND RESULTS TO 2010

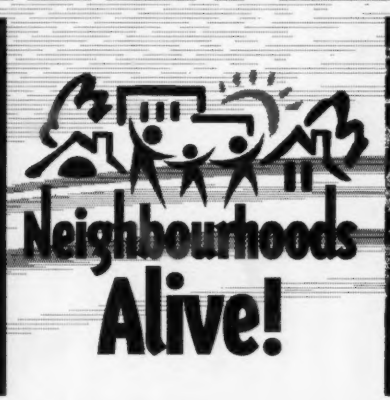
- The *Neighbourhoods Alive! Neighbourhood Renewal Fund*, administered by Manitoba Housing and Community Development, supports community greening projects.
  - Since 2000, the program has funded 40 projects that support the development, revitalization and expansion of green spaces, including community gardens and neighbourhood green space planning.

GREENING OUR SCHOOLS

DESCRIPTION AND RESULTS TO 2010

- 2008 – Green Manitoba, a special operating agency (SOA) of the Manitoba government, launched the *Green Schools Initiative*.
  - Approximately $700,000 in funding support was provided in 2008/2009 to help Manitoba school divisions green their school operations.
  - Funding allocations were used primarily for waste infrastructure; water efficiency and energy retrofits in schools; tree planting and outdoor classroom construction; and classroom materials regarding sustainability.
  - Approximately 0.9 kilotonnes (kt) of GHG emissions was avoided annually by waste diversion options (recycling and composting). Roughly 0.2 kt of waste was diverted from 79 different schools.





ACTIVE TRANSPORTATION ADVISORY GROUP

DESCRIPTION AND RESULTS TO 2010

- May 2009 – The *Active Transportation Advisory Group (ATAG)* was established by Manitoba Innovation, Energy and Mines to make recommendations to improve Manitoba's active transportation policy and infrastructure.
  - The *Active Transportation Advisory Group* completed its report and provided its recommendations to the Manitoba government in June 2011 (**www.gov.mb.ca/conservation/pdf/atag_report6.pdf**).

PUBLIC TRANSPORTATION

DESCRIPTION AND RESULTS TO 2010

- For many years, the Manitoba government has provided an annual grant to each municipality that operates a public transit system. Since 2007, the formula in place requires the Manitoba government to fund 50 per cent of the net operating costs of the transit service under *The Municipal Revenue (Grants and Taxation) Act*. The Manitoba government mandated the 50/50 funding grant requirement in 2008.
- 2008 – The Manitoba government allocated $17.9 million to five transit communities; $17.5 million to Winnipeg for rapid transit development; and $400,000 to four other communities for transit buses and other infrastructure.
- 2010 to 2014 – The Manitoba government established a new *Small Communities Transit Fund* component to the federal Gas Tax Fund in 2010. It will provide $1.0 million over four years. The fund supports transit infrastructure projects in smaller Manitoba transit communities (populations less than 40,000).

ACTIVE TRANSPORTATION PATHWAYS

DESCRIPTION AND RESULTS TO 2010

- 2007 to 2011 – The Manitoba government allocated $5.2 million in funding to 25 active City of Winnipeg transit projects, to the end of 2011. This allowed for the construction or renewal of approximately 50 kilometres (km) of pathways.

EXPANDING GREEN COMMUTING OPPORTUNITIES

DESCRIPTION AND RESULTS TO 2010

- August 2007 to August 2009 – The Manitoba government, in partnership with the Green Action Centre (formerly Resource Conservation Manitoba), the City of Winnipeg, and Transport Canada supported the *Community-Based Travel Marketing Pilot Project*. During the project, the Green Action Centre sampled 2,200 households within the Winnipeg Pembina Corridor, and found that drive-alone trips decreased by approximately 11.7 per cent and greenhouse gas (GHG) emissions for household trips were reduced by 18.2 per cent.

COMMUNITY-BASED INITIATIVES (YEAR-ROUND COMMUTER CHALLENGE)

DESCRIPTION AND RESULTS TO 2010

- October 15, 2010 – The *Manitoba Year-Round Commuter Challenge* was launched by the Green Action Centre.

GREEN ECONOMY AND GREEN JOBS OF THE FUTURE

DESCRIPTION AND RESULTS TO 2010

- June 2010 – The Manitoba government invested in the Virtual Centre of Manufacturing Excellence to help Manitoba companies increase their competitiveness by integrating lean manufacturing principles and other advanced processes into operations.
- October 2010 – The Manitoba government joined Wisconsin in exploring green economy and green job opportunities as part of a memorandum of understanding on climate change.
- December 2010 – The Manitoba government and Mitsubishi Heavy Industries of Japan signed a memorandum of understanding to explore renewable energy development opportunities and associated clean technologies.
- 2010 – Manitoba Education, together with the International Institute for Sustainable Development, published the *Green Jobs and Sustainable Careers Guide*.
- 2010 – The Manitoba government started work on the *Forum of Labour Market Ministers' Report* to the Council Of The Federation on The Canadian Labour Market: Meeting the Needs of a Greening Economy, which was held in June 2011.

POWER SMART SHOPS

DESCRIPTION AND RESULTS TO 2010

- March 2009 – Green Manitoba, a special operating agency (SOA) of the Manitoba government, and Manitoba Hydro jointly launched the *Power Smart Shops Program*.
  - The *Power Smart Shops Program* is a designation program that promotes energy and water efficiency to small and medium independent commercial businesses in Manitoba.
  - The program encourages businesses to fully convert their buildings to a *Power Smart Shops* efficiency level. It does this by providing expertise, competitive pricing and the installation of no/low cost energy-efficient products, including lighting, refrigeration, hot water and kitchen upgrades.

GREEN REGISTRY (PREVIOUSLY MANITOBA CLIMATE ACTION PORTAL)

DESCRIPTION AND RESULTS TO 2010

- The Green Registry (**www.greenregistry.org**) website was developed together with the Canadian Standards Association, using internationally recognized protocols and Manitoba-specific calculators. Manitobans can go online to get the necessary information to measure, reduce and report their greenhouse gas (GHG) emissions.
- The Green Registry also contains *Manitoba's GHG Dashboard*, which provides information on the province's GHG sources and volumes.

GREEN BUSINESS NETWORK

DESCRIPTION AND RESULTS TO 2010

- 2009 – An advisory committee on green business was created and co-chaired by the International Institute for Sustainable Development. It included representatives from business, labour, civil society and Northern and Aboriginal communities.

GREENING OUR PROVINCIAL BUILDINGS

DESCRIPTION AND RESULTS TO 2010

- 2008 to 2011 – Several Manitoba Infrastructure and Transportation (MIT) office buildings (up to seven in total) have been part of the *GREEN UP Building Performance Program.* This program is conducted by the Canada Green Building Council (CaGBC) to monitor and foster improved energy efficiencies in schools, commercial and office buildings.
- MIT is currently monitoring and reviewing the energy performance of its government-owned building portfolio. The historic energy data of the MIT portfolio serves to benchmark the operational performance of the various building designs and vintages.
- MIT has used Manitoba Hydro *Power Smart* programs to facilitate building upgrades for energy efficiency, lighting, heating and cooling systems to improve energy performance and reduce or maintain utility service costs in new building designs, and maintenance repairs and upgrades.
- MIT has begun a review of building operations with a goal of retro-commissioning its building portfolio. This process uses the Manitoba Hydro *Power Smart Commercial Building Optimization Program* to enhance building performance within operating budgets while training operations and support staff in the retro-commissioning process.
- MIT is actively working to improve building performance specifications for new construction, and in major renovations, to achieve optimum performance and maintainable building systems.

GREENING THE PROVINCIAL GOVERNMENT FLEET

DESCRIPTION AND RESULTS TO 2010

- To reduce fossil fuel use and greenhouse gas (GHG) emissions from Manitoba government vehicles, the Vehicle and Equipment Management Agency (VEMA), a special operating agency (SOA) of the Manitoba government:
  - requires executive management to use hybrid vehicles under an executive fleet policy
  - asks departments and agencies to reduce the amount of gasoline and diesel used in fleet vehicles by increasing fuel economy, operating more efficiently and reducing the number of miles driven by employees (through consultations)
  - asks departments to consider limiting the purchase or lease of four-wheel drive SUVs, and similar vehicles, when replacing older vehicles (vehicle-right sizing is advocated and Manitoba government departments are encouraged to consider hybrid gas/electric and other fuel efficient/low emission vehicles.)
  - dispenses biodiesel (at 13 rural Manitoba locations), primarily used as fuel for heavy equipment used by Manitoba Infrastructure and Transportation
- Regulations focusing on requirements for a fuel-efficiency standard for new passenger vehicles and light-duty trucks sold or leased in Manitoba ("new private vehicles") that are acquired by government, for government use are under development by Manitoba Infrastructure and Transportation – VEMA; and Manitoba Conservation and Water Stewardship. They are expected to come into force in 2013.

DECISION MAKING FOR CLIMATE CHANGE

DESCRIPTION AND RESULTS TO 2010
• 2009 - Criteria on climate change mitigation and adaptation were developed and integrated into land use and environmental assessment decision-making processes. Under *The Environment Act*, proposals must consider the amount of GHG emissions to be generated by, and the energy efficiency of, the proposed development.

ALTERNATIVES TO AIR AND LAND TRAVEL FOR GOVERNMENT ACTIVITIES

DESCRIPTION AND RESULTS TO 2010
• The province continues to reduce provincial employee air and land travel through the use of teleconferencing and expanded video conferencing capabilities.

Current scientific evidence reveals climate change is real; it is happening and its impacts will be felt throughout the 21st century. Signs of a changing climate are already evident across many regions of Canada. The resulting risks pose serious threats to our economy, natural habitat and communities.

The National Roundtable on the Environment and the Economy (NRTEE) has estimated that by 2020, climate change could cost Canada about $5 billion annually. This number could increase to $43 billion annually by 2050.

Manitoba and other Prairie provinces face a future risk of having less water available and a more inconsistent supply. The likely result is more frequent and severe drought and flooding, as well as other extreme weather such as snow storms, fires and pest infestation.

Since 2008, the Manitoba government has undertaken a range of adaptation actions outlined in *Beyond Kyoto*, as well as other initiatives to help reduce our vulnerability and increase our resilience to climate change.

9.1 | EXPANDED EMERGENCY PREPAREDNESS INITIATIVES

Severe weather is one serious impact of climate change. To build on Manitoba's emergency preparedness for various hazards, including severe weather, the Emergency Measures Office (EMO), of Manitoba Infrastructure and Transportation, is working to increase Weatheradio coverage in Manitoba. Weatheradio is a network of radio transmitters that provides continuous broadcasts of weather information and instant updates when weather threatens.

EMO has distributed Weatheradio receivers to all municipal offices; Manitoba Aboriginal and Northern Affairs and First Nations communities; schools and day care facilities; and hospitals and personal care homes located in areas with Weatheradio reception. EMO also worked with Pelmorex Media Inc. and the Broadcasters Association of Manitoba to improve the distribution of all-hazards alerts to the public.

Manitoba has also upgraded the seven water bombers in the province's forest fire fleet, and introduced advanced avionics and enhanced vision systems to help pilots battle fires in low visibility. These upgrades include state-of-the-art navigation, communication, satellite-tracking and enhanced infrared vision systems for pilots.

9.2 | ALL-WEATHER TRANSPORTATION, PORT OF CHURCHILL OPPORTUNITIES AND HEALTHY FOODS INITIATIVES

Manitoba Infrastructure and Transportation (MIT) has an adaptation strategy for the winter ice road network. It includes building structures to replace ice bridges, and relocating ice roads from water bodies to land-based winter roads. Since 2001, about 600 kilometres (km) of the system has been moved from lakes, rivers and creeks, onto land. This has improved safety, lessened environmental risks and promoted sustainability.

MIT established public-private partnerships to cost-share infrastructure upgrades to the transportation system and promote opportunities for the Port of Churchill. They invested $8 million in upgrades to the port, $60 million in improving the railway to the port, and $3 million in the Churchill Gateway Development Corporation to market the port.

The *Northern Healthy Foods Initiative (NHFI)*, managed by Manitoba Aboriginal and Northern Affairs, has helped northern communities adapt to climate change by providing more access to local foods. NHFI was designed to create healthier local food systems through the development of food self-sufficiency initiatives, such as gardening, greenhouses, composting awareness and promotion and the *Revolving Loan Freezer Purchase Program*.

By making nutritious local foods more accessible, programs like the NHFI help lessen northern residents' reliance on air and road (all-weather and winter) freight. This helps lower greenhouse gas (GHG) emissions and reduces store-bought packaging waste. These programs also stimulate economic development and diversification by improving the quality of northern Manitoba's food system. And giving northern communities an opportunity to produce and harvest their own food encourages them to make healthier food choices, which leads to healthier lives.

Manitoba Agriculture, Food and Rural Initiatives (MAFRI) also plays an active role in North by supporting and providing knowledge for agricultural production. The Northern Agriculture Program – a federal-provincial-territorial *Growing Forward* initiative under MAFRI – improves healthy food production and supply for northern Manitobans. As a result, they are less vulnerable and more resilient to climate change in the long run.

9.3 | MONITORING IMPACTS OF CLIMATE CHANGE ON WILDLIFE

Since 1999, Manitoba has protected more than 2.92 million hectares of the province, bringing the amount of protected area in Manitoba to more than 10.2 per cent. Manitoba's boreal forests are of particular importance because they are a shield against climate change and are home to many endangered and at-risk species. It is estimated that Manitoba's boreal forests store as much as 30 billion tonnes of carbon. In partnership with First Nations and the government of Ontario we have advanced protection of 33,400 square kilometres (km^2) of boreal forest on the east side of Lake Winnipeg as part of a UNESCO World Heritage Site bid. A report by the International Institute for Sustainable Development (IISD) estimates that the ecosystem of the proposed World Heritage Site will generate $121 million in services annually for local residents and the world. IISD also estimates the value of carbon stored within the forests and peat lands of the World Heritage Project area in the range of $2.7 to $17.5 billion.

The western sub-population of polar bear, found along Manitoba's coastline, is listed as "threatened" under *The Endangered Species Act* of Manitoba. Many efforts to protect the status of this population have been advanced. The Kaskatamagan Sipi Wildlife Management Area (WMA) and Kaskatamagan WMA, two significant new protected areas covering 393,350 hectares, were recently designated in the Hudson Bay Lowlands along Manitoba's coastline. Kaskatamagan WMA provides habitat for coastal caribou, arctic fox, marten, fisher, moose, and black bear, and the recently protected part of the WMA protects polar bear maternity denning areas. Kaskatamagan Sipi WMA, an inland site providing wintering range for coastal caribou, is home to moose, black bear, lynx, wolves, wolverines, and muskrats and globally significant bird populations.

In the last year alone, Manitoba established five new provincial parks across the province, which are home to significant wildlife including bears, moose, fox, eagles, songbirds and ducks. The new northern parks protect barren-ground caribou habitat, while the central parks provide habitat for a variety of threatened and endangered species including woodland caribou and piping plover.

9.4 | MONITORING IMPACTS OF CLIMATE CHANGE ON FORESTS AND PEATLANDS

In 2009, the new *Forest Health Protection Act* requirements came into effect, focusing on invasive species and developing and implementing climate change adaptation measures. The legislation seeks to prevent the establishment and spread of invasive species and other pests, such as the Emerald Ash Borer, and protect the health of our valuable urban and wild forests.

Manitoba Conservation and Water Stewardship's Forestry Branch is re-measuring Manitoba's Ecosystem Monitoring Network plots (National Forest Inventory), to assess and monitor the extent, state and sustainable development of Manitoba forests over the long term. The goal is also to provide data to support future forest adaptive planning; carbon budget modelling; and national and international reporting commitments for the Kyoto protocol.

Manitoba peatlands are important natural areas for biodiversity conservation, water resource management and climate regulation. They are also the most efficient terrestrial ecosystem for storing carbon. As a result, the province is developing a strategy for the protection and stewardship of Manitoba's peatlands.

9.5 | MANITOBA SUSTAINABLE AGRICULTURE PRACTICES PROGRAM (MSAPP)

Manitoba's *Sustainable Agriculture Practices Program (MSAPP)* is currently promoting producer incentives for beneficial management practices (BMPs). These incentives are designed to encourage producers to make sustainable choices and reduce GHG emissions. The BMPs cover improved manure storage, reduced tillage, manure land application, perennial cover for sensitive land, better pastures and forage quality, and grazing and pasture-management planning. The *Manitoba Organics Transition Program (MOTP)* also promotes greater resistance to climate change effects like droughts, through better management of soil.

To further address the effects of global warming, the *Environmental Farm Planning Initiative* will have a new chapter on climate change. As well, the *Climate Friendly Farm Woodlot Practices (CFWP)* continues to promote environmentally sensitive logging and forest regeneration, which helps reduce emissions and conserve the sustainability of forested landscapes.

9.6 | NEW REGULATIONS AND POLICIES ON WATER, WASTEWATER AND FLOOD PROTECTION

Manitoba Water Stewardship (MWS) (now part of Manitoba Conservation and Water Stewardship) implemented the following regulations to protect water quality:

- Effective January 1, 2009 – Fertilizers used in urban and built-up areas cannot contain more than one per cent phosphorus, by weight (Nutrient Management Regulation under *The Water Protection Act*).
- Effective January 1, 2009 – Manitoba golf courses are required to prepare annual nutrient management plans (NMPs). The plans must demonstrate how nutrients on their courses will be used, to ensure excess nutrients don't run off into waterways. In 2010, 45 NMPs for golf courses were developed across Manitoba (Nutrient Management Regulation under *The Water Protection Act*).

- Effective July 1, 2010 – The sale or distribution of automatic dishwashing detergents with phosphorus was prohibited throughout the province, as mandated by amendments to *The 2006 Phosphorus Reduction Act*. As a result, more products with 0.5 per cent phosphorus or less are now available.

To address flood protection throughout the province, MWS has undertaken the following initiatives:

- Local governments received 90 per cent in grant funding to purchase 21 properties, along the north Red River, that were at severe risk for ice jam flooding.
- Two Amphibex amphibious ice-breakers, five mobile amphibious ice-cutting machines, four amphibious support vehicles and various additional equipment were purchased to cut winter ice on rivers throughout Manitoba.
- Ongoing engineering and environmental impact studies are being done on the potential construction of gates for the spillway at the Shellmouth Dam. The goal is to increase reservoir storage capacity, and enhance its flood damage reduction capability and water supply function, for downstream agricultural and community use.
- Work is ongoing for riverbank stabilization and maintenance of the existing flood control works, like the Red River Floodway and the Portage Diversion, and the major provincial community ring dike.
- A significant investment has been made in flood and weather-forecasting tools and software.

The Manitoba Water Services Board, under Manitoba Infrastructure and Transportation (MIT), has taken the following measures to address the impacts of climate change:

- municipal water and wastewater capital infrastructure development
- rural water pipeline installations with safe drinking water to meet domestic and livestock needs, and availability of rural water tank holders for farmers
- demand-management initiatives like metering, flow reductions, industrial control systems on rural water supplies, variable frequency drives on pumps, expansion of treated water reservoirs, and installation of geothermal heating/air conditioning systems at large-water treatment facilities

MWS and Manitoba Health have developed policies and guidelines for public health and drinking water safety; published fact sheets for water system owners and the general public; and implemented a public education campaign to increase awareness of the need for private, well-water quality testing.

In November 2008, MWS created *WaterSmart Manitoba* – a program designed to promote water conservation to Manitobans through education. The goal of the program is to save 80 million litres of water annually.

In 2010, the *Power Smart Water and Energy Saver Program*, a MWS-Manitoba Hydro joint initiative, was launched. This program was responsible for distributing low-flow showerheads, faucet aerators and insulating pipe wrap (all at no cost) to more than 26,000 residential customers, resulting in an estimated savings of 9,000 litres of water per participant annually. It also provided materials to upgrade more than 12,000 multi-unit residential suites.

9.7 | WETLAND RESTORATION INCENTIVE PROGRAM (WRIP)

Manitoba Water Stewardship's (MWS's) (now part of Manitoba Conservation and Water Stewardship) *Wetland Restoration Incentive Program (WRIP)* has restored wetlands and made them sustainable for their carbon sequestration value, as well as for other important adaptive benefits.

These benefits include:

- additional surface water storage for drought and flood management
- preservation of prairie biodiversity
- sediment trapping and nutrient retention, which enhances water quality of adjacent lakes and rivers
- better ecosystem health and resilience

9.8 | OTHER PROVINCIAL ADAPTATION ACTIONS

9.8.1 PRAIRIES REGIONAL ADAPTATION COLLABORATIVE (PRAC)

Manitoba is currently participating in the two-and-a-half year collaborative with Alberta, Saskatchewan, Natural Resources Canada and the University of Regina. The *Prairies Regional Adaptation Collaborative (PRAC)* aims to help provincial and municipal decision-makers and other stakeholders better incorporate climate change adaptation into existing policy, planning and operations related to water resource management, drought and excessive moisture, and terrestrial (forest and grassland) ecosystem management, using a risk-based, decision-making framework.

9.8.2 MANITOBA-WISCONSIN COLLABORATIVE WORKSHOPS ON CLIMATE CHANGE

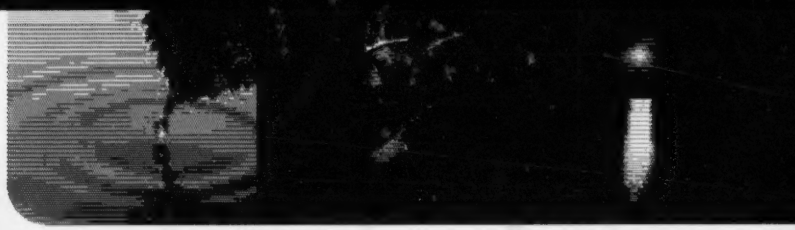
A Manitoba-Wisconsin memorandum of understanding (MOU) on climate change created a platform for collaboration among academic experts, business leaders and public sector decision-makers through a series of bilateral workshops. The workshops were designed to discuss climate change impacts in the North American Midwest region and seek further potential partnership opportunities.

In 2010, two bilateral workshops were held. One focussed on regional climate modelling and the other, on green economy and green jobs.

9.8.3 ENHANCED PROVINCIAL LAND USE POLICIES

Manitoba Local Government (MLG) is working to adopt new, provincial land-use policies to raise awareness of the importance of effective land-use planning in the 21st century. Local planning authorities are encouraged to plan their land use to better anticipate future climate change impacts. This involves a better integration of mitigation and adaptation decision-making when creating and amending development plans.

To support these efforts, MLG is developing planning resource materials to provide guidance to local planning authorities on how to integrate adaptation and mitigation strategies into their development plans and policies and apply them to their communities.



Adaptation is a response to the changing climate, and the implementation of policies/action taken to minimize the predicted impacts of climate change.

> An example of adaptation is the development of heat or drought-resistant crop cultivars that will be able to grow in warmer climates with potentially less water. Adaptation has the potential to reduce the magnitude of the challenges associated with climate change and take advantage of the possible benefits.

Active transportation is any mode of self-propelled transportation that relies on the use of human-generated energy.

Afforestation is a process of planting and growing forests to remove greenhouse gases (GHGs) from the atmosphere, on land that has not been recently forested.

Biodiesel is a safe, non-toxic, renewable fuel made from a variety of sources like vegetable oils, animal fats, tallow and used restaurant grease.

> Biodiesel can be used in its pure form, or blended with conventional diesel fuel at various levels, with little or no engine modification required. Biodiesel is made up of mono-alkyl esters of long-chain fatty acids, derived from vegetable oils or animal fats.

Biofuels or biomass fuels are produced from dry organic matter, or combustible oils produced by plants.

> These fuels are considered renewable as long as the vegetation producing them is maintained or replanted (ex: firewood, alcohol fermented from sugar, combustible oils extracted from soy beans). Using them in place of fossil fuels cuts greenhouse gas (GHG) emissions, because the plants that are the fuel sources capture carbon dioxide (CO_2) from the atmosphere.

Biomass energy or bioenergy refers to all forms of renewable energy derived from plant materials produced by photosynthesis.

> Biomass fuels can come from wood, agricultural crops and other organic residues. They are available from many sources in Canada, including sawmills, woodworking shops, forest operations and farms. Bioenergy is neutral in terms of CO_2 emissions. The burning of biomass fuels releases the CO_2 that plants absorb over their life spans. In contrast, the combustion of fossil fuels releases large quantities of long-stored CO_2, which contribute directly to global warming. Using bioenergy displaces fossil fuels and helps slow the rate of climate change.

Crop residue is the straw, stubble, or chaff from any crop, including baled or stacked crop material, and the remains of any un-harvested crop.

Demand side management is the planning, implementation and monitoring of activities designed to encourage consumers to change patterns of energy-consuming activities, including the timing and level of demand.

> Demand side management may refer to energy conservation programs (energy demand-side management) or strategies that result in more efficient uses of transportation resources (transportation demand-side management).

Ethanol is a high-octane, water-free alcohol produced from renewable resources like corn, wheat, straw and other biomass.

Ethanol can be used as a fuel, an additive to fuel or a fuel extender. It can also be used as an industrial chemical. When ethanol is blended with gasoline, the result is a cleaner, higher-octane fuel than regular gasoline.

Carbon Dioxide (CO_2) is a colorless, odourless, non-poisonous gas that is a normal part of the surrounding air.

Carbon dioxide is considered by climate change experts to be the highest contributor to human-induced global warming. Human activities such as fossil fuel combustion and deforestation have also been cited as sources for increased atmospheric concentrations of CO_2.

Carbon Dioxide equivalent (CO_2e) is an internationally accepted measure of the amount of global warming potential (GWP) of greenhouse gases.

GWP is a time-dependent index used to compare the radiative forcing of an impulse of a specific greenhouse gas (GHG), relative to that of carbon dioxide (CO_2). Carbon dioxide equivalent (CO_2e) is a standard measurement of the amount of CO_2 emissions that are reduced from, or added to, the environment. For example, the global warming potential for methane over 100 years is 21. This means that emissions of one-million metric tonnes of methane are equivalent to emissions of 21 million metric tonnes of CO_2.

Climate change is a change in expected climatic conditions that exceeds the natural climate variability over comparable time periods.

Climate change may be attributed directly, or indirectly, to human activity that alters the composition of the global atmosphere.

COP 16 is the Conference of the Parties of the United Nations Framework Convention on Climate Change (COP) which was held in Cancun, Mexico from November 29 to December 10, 2010.

Deforestation is the removal or ruin of forest stands by cutting and burning to provide building materials or fuel, or to create land for agricultural purposes, building sites or roads.

Emissions are the release of substances (ex: greenhouse gases) into the atmosphere.

Greenhouse Gas (GHG) includes any gas that absorbs infrared radiation in the atmosphere.

Greenhouse gases include water vapour, carbon dioxide (CO_2), halogenated fluorocarbons (HCFCs), hydrofluorocarbons (HFCs), ozone (O_3), methane (CH_4), nitrous oxide (N_2O), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6).

Gross Domestic Product (GDP) represents the total market value of all final goods and services produced in the Manitoba economy.

Kyoto Protocol is the international agreement (adopted in December 1997 in Kyoto, Japan) that sets binding emission targets for developed countries to reduce their emissions by an average of 5.2 per cent below 1990 levels.

Methane (CH_4) is a colourless, odourless, flammable gas, used as feedstock in the chemical industry (ex: hydrogen and methanol production), and as fuel for things like heating homes and operating vehicles.

Methane is produced naturally through anaerobic (without oxygen) decomposition of animal and plant wastes. It is also produced from industrial processes, wastewater treatments, landfills, fossil fuel extraction and production, and coal mines.

Mitigation is an intervention to reduce or prevent greenhouse gas (GHG) emissions, or any action that helps to remove atmospheric greenhouse gases.

Examples include using fossil fuels more efficiently in industrial processes and electricity generation, switching to solar energy or wind power, improving the insulation of buildings, and expanding forests and other "sinks" to eliminate greater amounts of carbon dioxide (CO_2) from the atmosphere.

Nitrous Oxide (N_2O) is a colourless, non-flammable, sweet-smelling gas, which is heavier than air.

Nitrouse oxide is used as an anesthetic in dentistry and surgery, and as a propellant in aerosol cans. N_2O is released naturally from oceans, by bacteria in soils, and from animal wastes. Other sources of N_2O are fossil fuel and biomass production, industrial production of nylon and nitric acid, and agricultural activities like soil cultivation and commercial and organic fertilizer use.

Offset is a unit of carbon dioxide equivalent (CO_2e) that is reduced, avoided, or sequestered to compensate for emissions occurring elsewhere (Source: World Resources Institute).

Perfluorocarbons (PFCs) a group of human-made chemicals composed of carbon and fluorine.

PFCs are used in manufacturing semiconductors. They are also used as solvents in the electronics industry, and as refrigerants of some specialized refrigeration systems. PFCs are also generated as a by-product of aluminum smelting and uranium enrichment.

Sequestration is the process of absorbing carbon dioxide (CO_2) out of the air through photosynthesis.

Sequestration converts CO_2 into plant sugars containing carbon.

Sink is a process, activity or mechanism that removes a greenhouse gas from the atmosphere.

Trees, for example, can be carbon sinks because they are able to convert CO_2 from the air into plant sugars through photosynthesis.

Sulfur Hexafluoride (SF_6) is a synthetic industrial gas largely used in heavy industry to insulate high-voltage equipment and help in the manufacturing of cable-cooling systems. There are no natural sources of SF_6.

Tonne is a measurement of mass equal to 1,000 kilograms (kg).

One kilotonne (kt) is equal to 1,000 tonnes. One megatonne (Mt) is equal to one million tonnes.

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